

ZOOLOGY.—*Additional observations on the oligochaete genus Syngenodrilus.*¹

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In the spring of 1945, in ignorance of the fact that Dr. G. E. Gates had included observations on the type of *Syngenodrilus* in an unpublished article entitled *On the Moniligastridae and phylogeny of the Oligochaeta*, the present author made an independent study of the specimen. Meanwhile, through correspondence with Dr. Gates, it was discovered that his article had been prepared for publication and that a carbon copy was available in the United States, although the original had been lost at the time of the Japanese invasion of Burma. After consultation with Dr. Waldo L. Schmitt, to whom my best thanks are due for his cooperation, and with the permission of Dr. Gates, it was decided to arrange for immediate publication of the first part of his article, that dealing with *Syngenodrilus*, in slightly condensed form together with some additional observations. The latter are presented herewith, in the form of a separate article, since there are certain discrepancies between the two accounts and the author did not feel that it would be right to introduce qualifications or corrections, based on his own opinion, into the text of Dr. Gates's account.

ADDITIONAL OBSERVATIONS

(1) *The sections.* The sections are mounted on 10 slides, labeled *a* to *j*, and except on four of these (*g* to *j*), where the gizzard region caused trouble, the series is reasonably complete and in good condition. The original description of Smith and Green, based largely on these sections, is remarkably accurate. Several of the original drawings are composite, but it is always possible to identify the actual sections from which they were made. No mistakes were discovered. On the other hand, as Gates has pointed out, no further light could be obtained regarding some of the points that were left unsettled in the original description; in particular, the relations of the septa in the region of

the testis sacs must remain obscure until new material can be examined. The relationships of the genital pores to the setae can be reconstructed without difficulty, and there is no doubt that the original account is essentially correct. The male pore appears on slide *a*, on the sixteenth and seventeenth sections from the beginning; the spermathecal pores are on the second row on slide *b*; the prostates are on slide *d*; the female pore is on slide *e*.

The gizzard has a cuticular lining which ceases in the dilated, thin-walled, crop-like region which follows. The position of the first intestinal segment cannot be determined.

(2) *The specimen.* Dorsal pores could not be seen either on the specimen or on the sections. The clitellum does not include the anterior third of segment *xi* but extends from 2/3 *xi* to *xvi* inclusive and is ring-shaped, as stated by Smith and Green. The male pore is clearly visible with good illumination and is situated in intersegmental furrow 12/13, about 3/5 *bc* lateral to setal line *b*; this observation conflicts with that of Gates but is in accordance with the evidence of the sections. The female pore is less conspicuous but can be seen lateral to seta *b* of segment *xiv*; this statement is not in agreement with that of Gates who found the female pores in front of seta *a*; on the sections, the oviduct is seen to open lateral to the *b* seta. The prostatic pores cannot be identified with certainty on the specimen, although clearly visible on the sections. Gates has described the position of the spermathecal pores, also very difficult to see, and their location is in agreement with that expected from a study of the sections.

A rectangular area resembling a copulatory band, which was not observed by Smith and Green or by Gates, occupies a region of the clitellum that is bounded above and below by setal lines *cd* and *ab*, respectively; this area is delimited anteriorly by intersegmental furrow 11/12 and posteriorly by the *ab* setae of segment *xiv*. The setae of the clitellar segments, difficult to see on the specimen, can readily be identified on the sections.

¹ Received October 24, 1945. See note to Dr. Gates's companion paper herein, p. 393.

Several attempts were made to obtain a sigmoid seta for examination, but unfortunately all that were removed proved to be broken at the distal extremity, no doubt as the result of much handling of the specimen. On the sections the ventral setae of segments xiv, xv, and xvi are preserved unbroken and in a favorable position for study; however, examination, even with an oil immersion apochromat, failed to reveal any definite evidence of ornamentation, although some faint surface markings of an obscure nature were observed. The refractive index of damar is unsuitable for the study of delicate setal ornamentation and the matter cannot be considered settled.

Confirming statements of Gates, the gizzards, shown in Smith and Green's fig. 2, have dropped out of the specimen and could not be found; there is no trace of calciferous glands either on the specimen or on the sections, and the intestine is without typhlosole. *Syngenorhynchus* is holonephric; nephridia from segments xlii and xliii were removed and mounted, the terminal duct has a pear-shaped dilation at its ectal end.

DISCUSSION

Gates's observations are, with minor exceptions, in close agreement with those of the present author, and there is no doubt that the general pattern of his conclusions must be supported. Two points may be added to his discussion of the problem: On the one hand, the nephridia are quite unlike those of the moniligastrid genus *Drawida*, in which there is a remarkable blind sac extending dorsally from the ectal duct. On the other hand, the suspicions raised in his footnote 6 regarding the position of the ovaries in *Alluroides* are fully justified. In the original description of *A. pordagei* Beddard² stated that the ovaries were in segment xiii but later in the same article, in the formal diagnosis of the new genus, the ovaries are said to be in segment xii. Evidently subsequent diagnoses by Michaelsen^{3,4} and Stephenson⁵ have perpetrated this error, which stemmed from a misprint in the original article, although

Beddard⁶ himself corrected the generic description. Stephenson attempted an interpretation of the *Syngenorhynchus* testis sacs as condensed segments and obtained, by a process of theoretical expansion, the following arrangement of the gonads: testes in x and xii, ovaries in xiv. Gates has pointed out that this interpretation is very improbable and reexamination of the material gives no support to such a theory.

Syngenorhynchus can not be included in the Moniligastridae, and it is clear that it has strong affinities with the Alluroididae. Gates has suggested that it might even be placed within the latter family, but there are important differences that would appear to necessitate the recognition of two distinct subfamilies, Alluroidinae and Syngenorhynchinae. In view of the inadequacy of our present knowledge of the Alluroididae,⁷ a family whose characters will probably be clarified by the discovery of new species and genera, it seems preferable to retain the family Syngenorhynchidae, while recognizing that future discoveries may bridge the gap that appears to exist at the present time. Michaelsen⁴ proposed that the families Phreoryctidae, Alluroididae, Syngenorhynchidae, and Moniligastridae should be placed together in the family-group Phreoryctina. It seems to the writer that there is much to be said in favor of such an arrangement; however, the Alluroididae and Syngenorhynchidae differ from Haplotaxidae (= Phreoryctidae) on the one hand, and from Moniligastridae on the other hand, in a number of important respects, of which the most significant is the backward migration of the male duct which opens to the exterior at 12/13 or on segment xiii. As Gates has pointed out, the Syngenorhynchidae differ from the Alluroididae in the possession of a well-developed, double, esophageal gizzard, in having simple *Sparganophilus*-like prostatic glands which are not related to the male opening, and in the absence of a moniligastrid-like atrium at the ectal end of the vas deferens.

⁶ F. BEDDARD, *A monograph of the order Oligochaeta*. Oxford, 1895.

⁷ The Alluroididae have hitherto been considered to be a purely African family, but the existence of an undescribed species in the Argentine was noted by L. Cernovitov (Mem. Soc. Zool. Tchechoslovaque Prague 3, 1936). Dr. Cernovitov informs me, *in litt.*, that this form is very close to the already known species but has enormous penial setae.

² F. BEDDARD, Quart. Journ. Micr. Sci. 36: 244-252. 1894.

³ W. MICHAELSEN, *Das Tierreich, Oligochaeta*. 1900.

⁴ W. MICHAELSEN, *Oligochaeta*, in Kükenthal and Krumbach's "Handbuch der Zoologie." 1928.

⁵ J. STEPHENSON, *The Oligochaeta*. Oxford, 1930.

A formal redefinition of the family follows; of necessity it includes some characters which may, with the discovery of new forms, prove to be of less than family significance.

Family SYNGENODRILIDAE Michaelsen
(1928)

Sigmoid setae single-pointed, eight per segment, in two ventral and two lateral bundles. Dorsal pores wanting. Clitellum in a single layer of cells, in the region of the male and female pores. One pair of male pores at 12/13; one pair of female pores on xiv; two pairs of spermathecal pores in 7/8 and 8/9. Two esophageal gizzards in viii and ix; no calciferous glands; intestine without typhlosole. Six

pairs of lateral hearts in vi to xi (?), those of vi and vii communicating with lateral "extra-esophageal" vessels. One pair of holonephridia per segment; ectal nephridial duct with a dilated vesicle. Holandric, two pairs of testes and spermiducal funnels in x and xi, respectively, enclosed in testis sacs; paired seminal vesicles depending backward from 10/11, enclosed within the ovisacs. One pair of ovaries in xiii; ovisacs depending backwards from 13/14 into xx; eggs yolky. Three pairs of simple prostatic glands opening on xi, xii, and xiii just lateral to the *b* setae, not associated with the male pores. Penial and genital setae lacking. Spermathecae without diverticula. One genus: *Syngenodrilus*; monotypic, *S. lamuensis* Smith and Green.

ICHTHYOLOGY.—*Notes on fishes in the Zoological Museum of Stanford University: XX, New fishes from China and India, a new genus, and a new Indian record.*¹ ALBERT W. C. T. HERRE, Stanford University. (Communicated by HERBERT FRIEDMANN.)

This paper terminates a series begun in 1934. The first paper was a brief account of the fishes of my 1931 Philippine expedition and was published by me in Hong Kong. The series continued with accounts of new or rare fishes collected by me in various parts of the world and was published in various journals in this country.

South China abounds with a great variety of fishes, both marine and fresh water, which even yet are imperfectly known. This is particularly true of the region from Hong Kong southward, which has never been explored by an ichthyologist. Ten days were spent in Hong Kong during March 1941, and many rare cold-blooded vertebrates were secured. Two trips were made to the New Territory to study the fish-pond industry and to do a little collecting. A new species of *Vaimosa* was obtained and is here presented. This genus is rich in species in the regions bordering on the South China Sea, including the adjacent islands.

The coastal waters of India have never been adequately explored for littoral fishes; this is true alike for the coral reefs of the extreme south and the long reaches of the Coromandel and Malabar coasts. Investigation of the coastal waters, including brack-

ish lagoons and the river mouths, should give us a greatly extended knowledge of fish distribution, as well as add many fishes to the known Indian fauna, some new species, and others known only from more or less remote regions. In this paper is recorded a fish hitherto known only from a single Philippine example, but really common in the Bay of Bengal. In addition, two gobies, an eleotrid, and a scorpaenid are presented as new. I have no doubt that collecting in the Andaman Islands would add 200 species to the known Indian fish fauna.

The labors of the competent staff of the Indian Zoological Survey, particularly of Dr. S. L. Hora, have added greatly to our knowledge of the fresh-water fishes of India, and as a result those of northern and central India are fairly well known. Much less has been done on the fishes of the streams of south India, and it is to be expected that new fishes should be found in that region, particularly in the hill streams. I have already described a new catfish from the Anamallai Hills, and now present a member of the genus *Homaloptera* from the same locality. Dr. Hora has already described two homalopterid fishes from Travancore and Mysore. One of them, *Bhavana australis*, was described by Jerdon

¹ Received July 2, 1945.